Programme syllabus

Master's Programme, Engineering Materials Science, 120 credits
Masterprogram, teknisk materialvetenskap
120.0 credits

Valid for students admitted to the education from autumn 12 (HT - Autumn term; VT - Spring term).

This is a translation of the Swedish, legally binding, programme syllabus.

Programme objectives

Beyond the goals which are specified by the Higher Degree ordinance, there are also specific goals for this programme. A graduate from the Materials Science programme will…

Knowledge and understanding

• have broad knowledge about material as well as processes in order to be able to develop and manufacture new materials and products
• have such a knowledge that he/she will be able to work within material-related industries within research and development as well as in production and manufacturing
• have good insights in current research and development work and industrial development trends.

Skills and abilities

• have a good ability to utilize modern modeling and simulation methods and their applications
• be able to possess the presentation, communication skills carry out an efficient work as well as warehouse work that good conditions for effective work are reached, both individually as well as in groups of different compositions
• display abilities needed to take part in research and development work or to independently work in other technical organizations
• show the ability to critically, creatively and independently plan and, with adequate methods and tools, create relevant products, processes and systems which fill human and society needs and from an ethical and professional point of view contribute to knowledge development

Ability to make judgements and adopt a standpoint

• show a professional and ethical responsibility in scientific, technical, ecological, and social organizations
• have understanding that engineering-related problems, seen in a system perspective, are often complex, can be incompletely defined, and sometimes contain contradictions
• show insights about technology’s role in society and human responsibility for how it is used, including social and economical aspects and environmental and workplace environment aspects even when developing new material and processes
• Show the ability to identify one’s need for further knowledge and continuously develop one’s own competence

KTH’s local degree ordinance can be found in KTH’s guidelines www.kth.se

Extent and content of the programme

The programme comprises 120 higher education credits which correspond to two years of full-time study. The programme is primarily in the second cycle.
The programme has three tracks.

Track 1: Industrial Materials, with the specialization Nordic International master programme, which is part of the Nordic International Masters Platform (NIMP)

Track 2: Materials and Process Design

Track 3: Materials Processing

The courses included each respective track can be found in Appendix 1.

The language of instruction is English.

**Eligibility and selection**

In order to be eligible for the Master’s programme, a relevant higher education degree, Bachelor of Science in Engineering or technical Bachelor degree, preferably within Industrial Materials comprising 180 higher education credits is required.

Corresponding degree from other engineering programmes such as Chemical Engineering, Mechanical Engineering, and Technical Physics provide eligibility for the Master’s Programme. For KTH’s programmes with English as the language of instruction, there is a special requirement of English B or the corresponding knowledge.

Other, corresponding, degrees within natural science in the first cycle can also provide eligibility provided that the relevant courses in mathematics, chemistry, physics, thermodynamics, and solid mechanics have been fulfilled. Other studies or work experiences are judged by competencies referred to.

Selection into the programme is based on an evaluation of the following criteria: University/higher education institution, grades, courses relevant to the programme, personal letter, work experience and references.

For more information, refer to KTH’s admission regulations which can be found in KTH’s guidelines, www.kth.se

**Implementation of the education**

**Structure of the education**

Study years, terms, and study periods are described in KTH’s guidelines, www.kth.se

When necessary, lectures can be scheduled outside the normal study year according to KTH’s guidelines. www.kth.se

**Structure of the education**

1) Industrial Materials (IMTA).
This track is only intended for students with a solid background in Material Science and Engineering and Metallurgy. Students on the Degree Programme in Materials Design and Engineering will receive a Master of Science in Engineering degree. All others will receive a Master of Science degree.

The program has a specialization, the Nordic international program which is a part of Nordic International Master Platform (NIMP). Those students following the Nordic International programme should spend a semester at one of the participating universities.

This track is only for students with a background in Mechanical Engineering, Chemical Science and Engineering, or Engineering Physics. It has the same focus as Industrial materials but with a content of the courses offered during the first term that also students without any deep prior knowledge in material and metallurgy can follow it.
3) Materials Processing (MPTA).
This track is mainly for students with a background in Metallurgy or Mechanical Engineering and with an interest in
massive forming and casting of metals. The track also provides a deeper understanding of the relationship between
processing and mechanical properties of metals.

Courses
The programme is course-based. Lists of courses are included in appendix 1.

Grading system
Courses in the first and the second cycle are graded on a scale from A to F. A-E are passing grades, A is the highest
grade. The grades pass (P) and fail (F) are used for courses under certain circumstances.

Conditions for participation in the programme

Term enrolment
A condition in order to participate in the studies is that the student, each spring and autumn must enroll for the coming
term. This is done through www.antagning.se between the 1st and 15th of November and the 1st and 15th of May,
respectively.

By completing term enrolment, the student has confirmed their intention to study and participate in the
programme. Only after that may the student be able to:

- Register for the term
- Register for courses
- Get reported results

Course registration
Registration for courses within the programme is done by the student before the start of each term, according to KTH’s
central guidelines.

Conditions for participation in the programme

For studies in study year 2:

At least 45 higher education credits must be completed from study year 1 by the end of the examination period in
August. Students who have not fulfilled this requirement must, in collaboration with a study adviser, create an
individual study plan. The main intent with the individual study plan is that the student will complete the remaining
elements during the next coming study year. In the study plan, the remaining elements should be included as well as
suitable courses from the next study year. Special consideration should be given to the courses’ prerequisites.

Selection of track
Selection of track is communicated to and implemented in connection with the program start, in consultation with the
program director. No site restrictions exist.

Recognition of previous academic studies
The student has the possibility to apply for recognition of previous academic studies from course(s) from another
university or higher education institution, national or international.

KTH’s entire policy for recognition of previous academic studies can be found in KTH’s guidelines www.kth.se
Degree project

KTH’s rules for the degree project can be found in KTH’s guidelines. Generally, it is required that a main portion of the studies must be completed before starting the degree project.

Degree

In order to earn the Degree of Master of Science within the major subject Material Science (Two Years), passing grades in all courses which are included in the student’s study plan are required. The study plan must comprise 120 higher education credits which include a degree project consisting of 30 higher education credits, in the second cycle.

KTH’s local degree ordinance can be found at http://intra.kth.se/regelverk/

Appendix 1 - Course list
Appendix 2 - Programme syllabus descriptions
Appendix 1: Course list

Master's Programme, Engineering Materials Science, 120 credits (TTMVM), Programme syllabus for studies starting in autumn 2012

**Track, Industrial Materials (IMTA)**

**Year 1**

**Mandatory courses (31.5 credits)**

<table>
<thead>
<tr>
<th>Course code</th>
<th>Course name</th>
<th>Credits</th>
<th>Edu. level</th>
</tr>
</thead>
<tbody>
<tr>
<td>AK2036</td>
<td>Theory and Methodology of Science with Applications (Natural and Technological Science)</td>
<td>7.5</td>
<td>Second cycle</td>
</tr>
<tr>
<td>MH2039</td>
<td>Process Engineering</td>
<td>6.0</td>
<td>Second cycle</td>
</tr>
<tr>
<td>MH2040</td>
<td>Applied Thermodynamics and Kinetics, Part 1</td>
<td>6.0</td>
<td>Second cycle</td>
</tr>
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<td>MH2041</td>
<td>Applied Thermodynamics and Kinetics, Part 2</td>
<td>6.0</td>
<td>Second cycle</td>
</tr>
<tr>
<td>MH2042</td>
<td>Simulation and Modeling Toolbox</td>
<td>6.0</td>
<td>Second cycle</td>
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**Conditionally elective courses**

<table>
<thead>
<tr>
<th>Course code</th>
<th>Course name</th>
<th>Credits</th>
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<tbody>
<tr>
<td>KD2380</td>
<td>Corrosion and Surface Protection</td>
<td>7.5</td>
<td>Second cycle</td>
</tr>
<tr>
<td>MH2000</td>
<td>Experimental Methods</td>
<td>6.0</td>
<td>Second cycle</td>
</tr>
<tr>
<td>MH2043</td>
<td>Advanced Course in Materials Design</td>
<td>12.0</td>
<td>Second cycle</td>
</tr>
<tr>
<td>MH2046</td>
<td>Quantum Metallurgy</td>
<td>6.0</td>
<td>Second cycle</td>
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<tr>
<td>MH2100</td>
<td>Powder Metallurgy</td>
<td>6.0</td>
<td>Second cycle</td>
</tr>
<tr>
<td>MH2252</td>
<td>Casting Processing</td>
<td>6.0</td>
<td>Second cycle</td>
</tr>
<tr>
<td>MH2281</td>
<td>Metal Forming</td>
<td>6.0</td>
<td>Second cycle</td>
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</table>

**Supplementary information**

At least 30 credits of the Conditionally Elective courses must be chosen year 1 or year 2.
## Year 2

### Conditionally elective courses

<table>
<thead>
<tr>
<th>Course code</th>
<th>Course name</th>
<th>Credits</th>
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<td>MH2044</td>
<td>Advanced Course in Process Sciences</td>
<td>12.0</td>
<td>Second cycle</td>
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<td>\textit{At least 30 credits of the Conditionally Elective courses must be chosen year 1 or year 2}</td>
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<td></td>
</tr>
<tr>
<td>MH2045</td>
<td>Energy and Materials Sustainability</td>
<td>6.0</td>
<td>Second cycle</td>
</tr>
<tr>
<td></td>
<td>\textit{At least 30 credits of the Conditionally Elective courses must be chosen year 1 or year 2}</td>
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<td></td>
</tr>
<tr>
<td>MH2280</td>
<td>Simulation and Modelling in Materials Processing</td>
<td>6.0</td>
<td>Second cycle</td>
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<td>\textit{At least 30 credits of the Conditionally Elective courses must be chosen year 1 or year 2}</td>
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<tr>
<td>MH2450</td>
<td>International Seminar in Material Processes</td>
<td>6.0</td>
<td>Second cycle</td>
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<td>\textit{At least 30 credits of the Conditionally Elective courses must be chosen year 1 or year 2}</td>
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<tr>
<td>MH2504</td>
<td>Industrial Metallurgical Processes</td>
<td>6.0</td>
<td>Second cycle</td>
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<td>\textit{At least 30 credits of the Conditionally Elective courses must be chosen year 1 or year 2}</td>
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### Supplementary information

Compulsory: Degree Project in Engineering Materials Sciens second level 30 credits

At least 30 credits of the Conditionally Elective courses must be chosen year 1 or year 2

### Track, Materials design (MDNA)

#### Year 1

### Mandatory courses (19.5 credits)

<table>
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<th>Course code</th>
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<th>Credits</th>
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<tbody>
<tr>
<td>AK2036</td>
<td>Theory and Methodology of Science with Applications (Natural and Technological Science)</td>
<td>7.5</td>
<td>Second cycle</td>
</tr>
<tr>
<td>MH2029</td>
<td>Extractive Metallurgy</td>
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<td>Second cycle</td>
</tr>
<tr>
<td>MH2038</td>
<td>Micro and Nano Structures in Materials</td>
<td>6.0</td>
<td>Second cycle</td>
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### Conditionally elective courses

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<tr>
<td>MH2000</td>
<td>Experimental Methods</td>
<td>6.0</td>
<td>Second cycle</td>
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<tr>
<td>MH2032</td>
<td>Mechanical Properties of Materials</td>
<td>6.0</td>
<td>Second cycle</td>
</tr>
<tr>
<td>MH2037</td>
<td>Ceramics</td>
<td>6.0</td>
<td>Second cycle</td>
</tr>
<tr>
<td>MH2040</td>
<td>Applied Thermodynamics and Kinetics, Part 1</td>
<td>6.0</td>
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<td>\textit{One of the courses MH2040 or MH2041 must be chosen}</td>
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<tr>
<td>MH2041</td>
<td>Applied Thermodynamics and Kinetics, Part 2</td>
<td>6.0</td>
<td>Second cycle</td>
</tr>
</tbody>
</table>
### Course code | Course name                                   | Credits | Edu. level
---|----------------------------------------------|---------|---------
MH2042 | Simulation and Modeling Toolbox               | 6.0     | Second cycle
MH2043 | Advanced Course in Materials Design           | 12.0    | Second cycle
MH2046 | Quantum Metallurgy                            | 6.0     | Second cycle
MH2100 | Powder Metallurgy                             | 6.0     | Second cycle

**Supplementary information**

One of the courses MH2040 or MH2041 must be chosen.

At least 30 credits of the Conditionally Elective courses must be chosen year 1 or year 2.

#### Year 2

**Conditionally elective courses**

| Course code | Course name                                      | Credits | Edu. level
---|--------------------------------------------------|---------|---------
MH2044 | Advanced Course in Process Sciences              | 12.0    | Second cycle
MH2045 | Energy and Materials Sustainability              | 6.0     | Second cycle
MH2280 | Simulation and Modelling in Materials Processing | 6.0     | Second cycle
MH2450 | International Seminar in Material Processes      | 6.0     | Second cycle
MH2504 | Industrial Metallurgical Processes              | 6.0     | Second cycle

**Supplementary information**

At least 30 credits of the Conditionally Elective courses must be chosen year 1 or year 2.

Compulsory: Degree Project in Engineering Materials Science 30 hp second level

### Track, Materials Processing (MPTA)

#### Year 1

**Mandatory courses (25.5 credits)**

| Course code | Course name                                      | Credits | Edu. level
---|--------------------------------------------------|---------|---------
AK2036 | Theory and Methodology of Science with Applications (Natural and Technological Science) | 7.5     | Second cycle
MH2032 | Mechanical Properties of Materials               | 6.0     | Second cycle

Study Programme for Master's Programme, Engineering Materials Science, 120 credits batch autumn 12. Appendix 1, page 3 of 5
### Course code

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<td>Second cycle</td>
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<tr>
<td>MH2100</td>
<td>Powder Metallurgy</td>
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<td>Second cycle</td>
</tr>
<tr>
<td>MH2278</td>
<td>Materials Forming</td>
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<td>Second cycle</td>
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At least 30 credits of the Conditionally Elective courses must be chosen year 1 or year 2.

### Year 2

#### Mandatory courses (6.0 credits)

<table>
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<tbody>
<tr>
<td>MH2281</td>
<td>Metal Forming</td>
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Compulsory: Degree Project in Engineering Materials Science 30 hp second level
Appendix 2: Specialisations

Master's Programme, Engineering Materials Science, 120 credits (TTMVM), Programme syllabus for studies starting in autumn 2012

- Track, Industrial Materials (IMTA)
- Track, Materials design (MDNA)
- Track, Materials Processing (MPTA)